

WHAT IS CLAIMED IS:

1. A method for synthesizing an array of chemical compounds on the surface of a support wherein said synthesis comprises a plurality of steps, said method  
5 comprising performing at least two of said steps by:

(a) placing a support having a functionalized surface into a chamber of a flow cell and subjecting said surface to one step of said synthesis and

(b) placing said support into a chamber of another flow cell and subjecting said surface to another step of said synthesis.

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2. A method according to Claim 1 further comprising placing said support after step (b) of said synthesis into a chamber of another flow cell and subjecting said surface to another step of said synthesis.

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3. A method according to Claim 1 wherein said synthesis comprises "n" number of steps and said method comprises independently placing a support into a chamber of one of "n" number of flow cells and subjecting said surface to a different step of said synthesis in each of said flow cells.

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4. A method according to Claim 1 wherein reagents for step (a) of said synthesis are in separate fluid communication with said flow cell of step (a) and reagents for step (b) of said synthesis are in separate fluid communication with said flow cell of step (b).

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5. A method according to Claim 1 wherein at least one of said steps of said synthesis comprises contacting said surface with a fluid reagent and washing said surface.

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6. A method according to Claim 1 wherein said chemical compounds are polymers.

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7. A method according to Claim 6 wherein said polymers are biopolymers.

8. A method according to Claim 1 wherein said flow cells comprise a holder for said support.

9. A method according to Claim 1 wherein said flow cells comprise at least  
5 one inlet and an outlet.

10. A method according to Claim 9 wherein a condition of fluid exiting said outlet is determined and based on said determination at least a portion of said fluid is directed to said inlet or to a waste container for said fluid.

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11. A method according to Claim 9 wherein fluid exiting said outlet is subjected to purification and a condition of said fluid is determined and based on said determination at least a portion of said fluid is directed to said inlet or to a waste container for said fluid.

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12. A method according to Claim 9 wherein a wash solution and a reagent for said synthesis are independently directed to said inlet.

13. A method for synthesizing an array of biopolymers on the surface of a  
20 support wherein said synthesis comprises a plurality of monomer additions, said method comprising after each of said monomer additions

(a) placing said support into a chamber of a flow cell and subjecting said surface to a step of said synthesis that is subsequent to a monomer addition and

(b) placing said support into a chamber of another flow cell and subjecting  
25 said surface to another step of said synthesis that is subsequent to step (a).

14. A method according to Claim 13 wherein each of said steps comprises a wash.

15. A method according to Claim 13 wherein said biopolymers are  
30 polynucleotides.

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16. A method according to Claim 13 wherein step (a) comprises subjecting said surface to an oxidizing agent.

17. A method according to Claim 13 wherein step (b) comprises subjecting said surface to an agent for removing a protecting group.

18. A method according to Claim 13 wherein said flow cells comprise at least one inlet and an outlet and a holder for said support.

19. A method according to Claim 13 wherein a condition of fluid exiting said flow cell is determined and based on said determination at least a portion of said fluid is directed to said flow cell or to a waste container for said fluid.

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20. A method according to Claim 18 wherein fluid exiting said flow cell is subjected to purification and a condition of said fluid is determined and based on said determination at least a portion of said fluid is directed to said flow cell or to a waste container for said fluid.

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21. A method according to Claim 18 wherein a wash solution and a reagent for said synthesis are independently directed to said inlet.

22. A method according to Claim 18 wherein said fluid is an organic solvent.

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23. A method according to Claim 13 wherein said biopolymers are peptides.

24. A method according to Claim 13 wherein said biopolymers are synthesized on said surface in multiple arrays and said support is subsequently diced into individual arrays of biopolymers on a support.

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25. A method according to Claim 13 wherein reagents for said first step of said synthesis are in separate fluid communication with said first flow cell and reagents for said second step of said synthesis are in separate fluid communication with said second flow cell.

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26. A method according to claim 13 further comprising exposing the array to a sample and reading the array.

27. A method according to claim 26 comprising forwarding data representing a result obtained from a reading of the array.

28. A method according to claim 27 wherein the data is transmitted to a  
5 remote location.

29. A method according to claim 26 comprising receiving data representing a result of an interrogation obtained by the reading of the array.

10 30. An apparatus for synthesizing an array of biopolymers on the surface of a support, said apparatus comprising:

- (a) a plurality of flow cells,
- (b) one or more fluid dispensing stations in fluid communication with one or more of said plurality of flow cells,
- 15 (c) a station for monomer addition to said surface of said support, and
- (d) a mechanism for moving a support to and from said station for monomer addition and a flow cell and from one flow cell to another flow cell.

31. An apparatus according to Claim 30 further comprising a controller for  
20 controlling the movement of said mechanism.

32. An apparatus according to Claim 30 wherein said mechanism is a robotic arm.

25 33. An apparatus according to Claim 30 wherein said flow cells comprise a chamber, a holder for said support, at least one inlet and an outlet.

34. An apparatus according to Claim 33 wherein said apparatus further comprises a manifold in fluid communication with said inlet.

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35. An apparatus according to Claim 30 wherein said apparatus further comprises a purification system in fluid communication with said outlet.

36. An apparatus according to Claim 30 wherein said apparatus further comprises a holding chamber in fluid communication with said purification system.

37. An apparatus according to Claim 36 wherein said apparatus further  
5 comprises a sensor in fluid communication with holding chamber.

38. An apparatus according to Claim 30 wherein said apparatus further comprises a sensor in fluid communication with said outlet.

10 39. An apparatus according to Claim 30 wherein reagents for a step of said synthesis are in separate fluid dispensing stations in fluid communication with one of said flow cells and reagents for another step of said synthesis are in separate fluid dispensing stations in fluid communication with another of said flow cells.

15 40. A method comprising using an array, prepared by an apparatus according to claim 30, by exposing the array to a sample and reading the array.

41. A method according to claim 40 comprising forwarding data representing a result obtained from a reading of the array.

20 42. A method according to claim 41 wherein the data is transmitted to a remote location.

43. A method according to claim 40 comprising receiving data representing a  
25 result of an interrogation obtained by the reading of the array.

44. An apparatus for synthesizing an array of biopolymers on the surface of a support, said apparatus comprising:

(a) a plurality of flow cells wherein said flow cells comprise a chamber, a  
30 holder for said support, at least one inlet and an outlet, wherein each of said inlets is in fluid communication with a manifold and wherein said outlet is in controlled fluid communication with one or more purification systems, holding chambers and sensors,

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(b) one or more fluid dispensing stations in fluid communication with one or more of said plurality of flow cells by means of said manifolds,

(c) a station for monomer addition to said surface of said support,

(d) a mechanism for moving a support to and from said station for monomer  
5 addition and a flow cell and from one flow cell to another flow cell, and

(e) a controller for controlling the movement of said mechanism.

45. An apparatus according to Claim 44 wherein said mechanism is a robotic  
arm.

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46. An apparatus according to Claim 44 wherein said apparatus further  
comprises a purification system in fluid communication with said outlet.

47. An apparatus according to Claim 44 wherein said apparatus further  
15 comprises a holding chamber in fluid communication with said purification system.

48. An apparatus according to Claim 47 wherein said apparatus further  
comprises a sensor in fluid communication with holding chamber.

20 49. An apparatus according to Claim 44 wherein said apparatus further  
comprises a sensor in fluid communication with said outlet.

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